

REMARKS/ARGUMENTS

In view of both the amendments presented above and the following discussion, the Applicants submit that none of the claims now pending in the application is anticipated under the provision of 35 USC §102(b) or 35 USC § 102(e). Thus, the Applicants believe that all of these claims are now in allowable form.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, the Examiner should telephone Janet M. Skafar, Esq., (650)988-0655 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Drawings

The Examiner has required new corrected drawings because the drawings do not represent a formal copy. The Examiner has required that Figures 2 and 7A, 7B and 7C be corrected because they are too dark, and the notations on the drawings are not discernable. In response, the Applicants have submitted corrected formal drawings.

Status of Claims

Claims 1-48 are pending in this application. Claims 1, 8, 9, 11, 22, 23, 25, 28, 30, 33, 34, 36, 45 and 48 have been amended. Claims 49-51 are new.

Claim Objections

In paragraph 5, the Examiner objected to claims 8, 9, 11, 22, 23, 25, 28, 30, 33, 34, 36, 45 and 48.

Regarding claim 8, the Applicants have amended claim 8 in accordance with the Examiner's suggestion.

Regarding claim 22, the Applicants have corrected the dependency such that claim 22 now depends from claim 21.

Regarding claim 23, the Applicants have corrected the dependency such that claim 23 now depends from claim 18.

Regarding claim 25, the Applicants have amended claim 25 in accordance with the Examiner's suggestion.

Regarding claim 28, the Applicants have corrected the dependency such that claim 28 now depends from claim 26.

Regarding claim 30, the Applicants have corrected the dependency such that claim 30 now depends from claim 29.

Regarding claim 33, the Applicants have amended claim 33 in accordance with the Examiner's suggestion.

Regarding claim 45, the Applicants have corrected the dependency of claim 45 such that claim 45 now depends from claim 44.

Regarding claim 48, the Applicants have amended claim 48 in accordance with the Examiner's suggestion.

In paragraph 6, regarding claim 9, the Examiner indicated that there is insufficient basis for the limitation of "said representative performance measurement." In

response, Applicants have amended claim 9 to recite “a representative performance measurement.”

In paragraph 7, regarding claim 11, the Examiner indicated that there is insufficient basis for the limitation of “said representative performance measurement.” In response, Applicants have amended claim 11 to recite “a representative performance measurement.”

In paragraph 8, regarding claim 34, the Examiner indicated that there is insufficient basis for the limitation of “said representative performance measurement.” In response, Applicants have amended claim 34 to recite “a representative performance measurement.”

In paragraph 9, regarding claim 36, the Examiner indicated that there is insufficient basis for the limitation of “said representative performance measurement.” In response, Applicants have amended claim 36 to recite “a representative performance measurement.”

Rejections Under 35 USC § 112

Claims 1-8, 18-33, and 41-48 were rejected under 35 USC § 112, first paragraph, as failing to comply with the enablement requirement.

The rejection of Claim 1 asserts that one skilled in the art is not enabled to use the relationship provided in claim 1 to compute the maximum number of symbol errors that can be corrected t because the maximum number of symbol errors t is not included in the relationship. The rejection further asserts that the relationship, given by equation 16.1 on page 81, is described in the specification as “similar to the method described in section I with respect to Figure 5 except that the FEC parameters include the number of DMT symbols per FEC frame s and the number of FEC control code symbols

per DMT symbol z , rather than the maximum number of correctable errors t (page 84, lines 7-10).” The rejection then contends that the relationship does not involve the number of correctable errors t , and the claim is not enabled to one of ordinary skill in the art by the specification.

In response, the Applicants have removed the reference to: “a maximum number of symbol errors that can be corrected t .”

The rejection also asserted that the closest relationship in the specification defining $W(s, z, K)$ is equation 16.3 found on page 82, and that the equation 16.3 of page 82 includes the framing mode index ρ which is not included in the relationship of the claim. Therefore, the rejection asserts that claim 1 is not enabled by the specification.

In response, claim 1 has been amended to include the framing mode index ρ in the relationship for $W(s, z, K)$. Therefore, Applicants submit that claim 1 is enabled by the specification.

Claims 2 and 3 were rejected as being dependent upon a rejected parent claim. Because claim 1 has been amended to overcome the rejection, the rejection of claims 2 and 3 is now moot.

The rejection of Claim 4 under 35 USC § 112, first paragraph asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not enabled by the specification because it is not present in the specification. The rejection asserted that the closest relationship in the specification defining the difference between a bit error rate prior to decoding and the target bit error rate Θ is found in equation 17.2 of page 87. The rejection also asserted that the equation 17.2 of page 87 includes the framing mode index ρ which is not included in the relationship of the claim. Therefore, the rejection contends that claim 4 is not enabled by the specification.

In response, the Applicants have amended claim 4 to include ρ . Claim 1, from which claim 4 depends, defines ρ . The original relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$ has been deleted. A new relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$, which includes ρ , has been added. Support for the relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$ can be found on page 87, relationship (17.2). Therefore, Applicants submit that claim 4 is enabled by the specification.

Claims 5-8 were rejected as being dependent upon a rejected parent claim. Claims 5, 6, 7 and 8 depend from claims 4, 1, 1 and 7, respectively. Because claims 1 and 4 have been amended, the rejection of claims 5, 6, 7 and 8 is now moot.

The rejection of claim 18 asserts that one skilled in the art is not enabled to use the relationship provided in claim 1 to compute the maximum number of symbol errors that can be corrected t because the maximum number of symbol errors t is not included in the relationship. The rejection further asserts that the relationship, given by equation 16.1 on page 81, is described in the specification as “similar to the method described in section I with respect to Figure 5 except that the FEC parameters include the number of DMT symbols per FEC frame s and the number of FEC control code symbols per DMT symbol z , rather than the maximum number of correctable errors t (page 84, lines 7-10).” The rejection then contends that the relationship does not involve the number of correctable errors t , and the claim is not enabled to one of ordinary skill in the art by the specification.

In response, the Applicants have removed the reference to: “a maximum number of symbol errors that can be corrected t . In addition, the Applicants have deleted

the original relationship for $1 - \left(1 - W(s, z, K) \epsilon_s^{\frac{1}{k(0.5sz+1)}} \right)^{1/\alpha}$ and the original relationship

for $W(s, z, K)$. Applicants have added relationship, $1 - \left(1 - W(s, z, K, k) \epsilon_s^{\frac{1}{k(0.5sz+1)}} \right)^{1/\alpha}$ and

relationship $W(s,z,K,k)$. Therefore, claim 18 now includes a maximum number of retries k . Support for these relationships can be found on page 140, relationship (19.4) and page 139, relationship (19.1). These relationships, which include k , were added so that claim 18 claims different subject matter from amended claim 1. Therefore, the Applicants submit that claim 18 is enabled by the specification.

Claims 19 and 20 were rejected as being dependent upon a rejected parent claim. Because claim 18 has been amended to overcome the rejection under 35 USC § 112, first paragraph, this rejection of claims 19 and 20 is now moot.

The rejection of claim 21 asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not enabled by the specification because it is not present in the specification. The rejection also asserts that the closest relationship in the specification defining the difference between a bit error rate prior to decoding and the target bit error rate Θ is found in equation 17.2 of page 87. The rejection then asserts that equation 17.2 of page 87 includes the framing mode index p which is not included in the relationship of the claim, and that, therefore, claim 21 is not enabled by the specification.

In response, the Applicants respectfully submit that original claim 21 included p . Claim 18, from which claim 21 depends, defines p . The original relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$ has been deleted. A relationship for $\Theta(K)$ has been added. Support for the relationship for $\Theta(K)$ can be found on page 141, relationship (19.5). The relationship for $\Theta(K)$ includes p . In addition, $\Theta(K)$ includes a maximum number of retries k . The maximum number of retries k was included to claim different subject matter from amended claim 4. Therefore, the Applicants submit that claim 18 is enabled by the specification.

Claims 22, 23, 24 and 25 were rejected as being dependent upon a rejected parent claim. Claims 22, 23, 24 and 25 depend either directly or indirectly from claim 18.

Because claim 18 has been amended to overcome the rejection under 35 USC § 112, first paragraph, the rejection of claims 22, 23, 24 and 25 is now moot.

The rejection of claim 26 asserts that one skilled in the art is not enabled to use the relationship provided in claim 26 to compute the maximum number of symbol errors that can be corrected t because the maximum number of symbol errors t is not included in the relationship. The rejection further asserts that the relationship, given by equation 16.1 on page 81, is described in the specification as “similar to the method described in section I with respect to Figure 5 except that the FEC parameters include the number of DMT symbols per FEC frame s and the number of FEC control code symbols per DMT symbol z , rather than the maximum number of correctable errors t (page 84, lines 7-10).” The rejection then asserts that, hence, the relationship does not involve the number of correctable errors t , and that the claim is not enabled to one of ordinary skill in the art by the specification.

In response, the Applicants have removed the reference to: “a maximum number of symbol errors that can be corrected t .”

The rejection also asserts that the closest relationship in the specification defining $W(s, z, K)$ is equation 16.3 found on page 82, and that the equation 16.3 of page 82 includes the framing mode index p which is not included in the relationship of the claim. The rejection then contends that claim 26 is not enabled by the specification.

In response, the Applicants have amended claim 26 to include the framing mode index p in the relationship for $W(s, z, K)$. Therefore, the Applicants submit that claim 26 is enabled by the specification.

Claims 27 and 28 were rejected as being dependent upon a rejected parent claim. Claims 27 and 28 depend from claim 26. Because claim 26 has been amended to

overcome the rejection under 35 USC § 112, first paragraph, the rejection of claims 27 and 28 is now moot.

The rejection of claim 29 under 35 USC § 112, first paragraph asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not enabled by the specification because it is not present in the specification. The rejection also asserts that the closest relationship in the specification defining the difference between a bit error rate prior to decoding and the target bit error rate Θ is found in equation 17.2 of page 87. The rejection also asserts that the equation 17.2 of page 87 includes the framing mode index ρ which is not included in the relationship of the claim. The rejection then contends that claim 29 is not enabled by the specification.

In response, the Applicants have amended claim 29 to include ρ . Claim 26, from which claim 29 depends, defines ρ . The original relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$ has been deleted. A relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$, which includes ρ , has been added. Support for the relationship for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$ can be found on page 87, relationship (17.2). Therefore, the Applicants submit that claim 29 is enabled by the specification.

Claims 30, 31, 32 and 33 were rejected as being dependent upon a rejected parent claim. Claims 30, 31, 32 and 33 depend either directly or indirectly from claim 29. Because claim 29 has been amended to overcome the rejection under 35 USC § 112, first paragraph, the rejection of claims 30, 31, 32 and 33 is now moot.

The rejection of claim 41 asserts that one skilled in the art is not enabled to use the relationship provided in claim 41 to compute the maximum number of symbol errors that can be corrected t because the maximum number of symbol errors t is not included in the relationship. The rejection further asserts that the relationship, given by equation 16.1 on page 81, is described in the specification as “similar to the method

described in section I with respect to Figure 5 except that the FEC parameters include the number of DMT symbols per FEC frame s and the number of FEC control code symbols per DMT symbol z , rather than the maximum number of correctable errors t (page 84, lines 7-10).” The rejection then asserts that the relationship does not involve the number of correctable errors t , and the claim is not enabled to one of ordinary skill in the art by the specification.

In response, the Applicants have removed the reference to: “a maximum number of symbol errors that can be corrected t .” In addition, the Applicants have deleted the original relationship for $1 - \left(1 - W(s, z, K) \epsilon_s^{\frac{1}{k(0.5sz+1)}} \right)^{1/\alpha}$ and the original relationship for $W(s, z, K)$. Applicants have added a relationship, $1 - \left(1 - W(s, z, K, k) \epsilon_s^{\frac{1}{k(0.5sz+1)}} \right)^{1/\alpha}$ and relationship $W(s, z, K, k)$. Therefore, claim 41 now includes a maximum number of retries k . Support for these relationships can be found on page 140, relationship (19.4) and page 139, relationship (19.1). These relationships, which include k , were added so that claim 41 claims different subject matter from amended claim 26. Therefore, the Applicants submit that claim 41 is enabled by the specification.

Claims 42 and 43 were rejected as being dependent upon a rejected parent claim. Claims 42 and 43 depend from claim 41. Because claim 41 has been amended to overcome the rejection under 35 USC § 112, first paragraph, the rejection of claims 42 and 43 and is now moot.

The rejection of claim 44 asserts that the relationship for determining the difference between a bit error rate prior to decoding. The rejection of claim 44 asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not enabled by the specification because it is not present in the specification. The rejection also asserts that the closest relationship in the

specification defining the difference between a bit error rate prior to decoding and the target bit error rate Θ is found in equation 17.2 of page 87, and indicated that the equation 17.2 of page 87 includes the framing mode index ρ which is not included in the relationship of the claim. The rejection then contends that claim 44 is not enabled by the specification.

In response, Applicant respectfully submits that original claim 44 included ρ . Claim 41, from which claim 44 depends, defines ρ . The original relationships for $\Theta(K)$ and for $\omega(b(\gamma_{eff}, s, z))p_{QAM}$ have been deleted. Another relationship for $\Theta(K)$ has been added. Support for the added relationship for $\Theta(K)$ can be found on page 141, relationship (19.5). The added relationship for $\Theta(K)$ includes ρ . In addition, the added relationship $\Theta(K)$ includes a maximum number of retries k . The maximum number of retries k was included to claim different subject matter from amended claim 29. Therefore, the Applicants submit that claim 44 is enabled by the specification.

Claims 45, 46, 47 and 48 were rejected as being dependent upon a rejected parent claim. Claims 45, 46, 47 and 48 depend either directly or indirectly from claims 41 and 44. Because claims 41 and 44 have been amended to overcome the rejection under 35 USC § 112, first paragraph, the rejection of claims 45, 46, 47 and 48 is now moot.

Rejections Under 35 USC § 112 Second Paragraph

In paragraph 13, claims 1-8, 18-33 and 41-48 are rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

The rejection of claim 1 asserts that the relationship is not fully defined so that one skilled in the art could utilize it. The rejection asserts that claim 1 is indefinite because there are items or functions in the claim that have no definition, and that the

following variables or constants in the relationship of claim 1 are not defined: ϵ_s , and α . In response, Applicants have amended claim 1 to define ϵ_s , and α .

The rejection of claim 1 also asserts that the number of bit positions b is used as a function of 3 variables, (i.e., $b(\gamma_{eff}, s, z)$), although this function is not defined. The rejection indicated that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), the relationship should be defined in the claim.

In response, the Applicants have amended claim 1 to provide a relationship to define $b(\gamma_{eff}, s, z)$. Therefore the Applicants submit claim 1 is not indefinite under 35 USC § 112, second paragraph.

Claim 2 was rejected as being dependent upon a rejected parent claim. Because claim 1 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 2 is now moot.

Claim 3 was rejected because the value of N_{max} is not defined. In response, claim 3 has been amended to define N_{max} as a predetermined value. Therefore the Applicants submit claim 3 is not indefinite under 35 USC § 112, second paragraph.

The rejection of claim 4 asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not fully defined because the definition of sn_{eff} is not provided in the claim, and the lacking definition renders the claim indefinite. The rejection further asserts that the claim is indefinite because the target bit error rate p_e is also defined as the channel symbol error rate p_e .

In response, the Applicants have amended claim 4. The Applicants respectfully submit that s is defined in claim 1, from which claim 4 depends. The Applicants have amended claim 1 to define n_{eff} . Because claim 4 depends from claim 1, n_{eff} is defined for claim 4. Claim 4 has also been amended to delete the language that defines p_e as a channel symbol error rate. Therefore the Applicants submit claim 4 is not indefinite under 35 USC § 112, second paragraph.

Claim 5 was rejected as being dependent upon a rejected parent claim, claim 4. Because claim 4 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 5 is now moot.

The rejection of claim 6 asserts that the function of the number of bit positions of a quadrature amplitude modulation symbol $b(\gamma_{eff}, s, z)$ is set to $(\alpha N_{max}/sn_{eff})$, but is unclear if the number of bit positions b is a function (see regarding claim 1). The rejection asserts that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), it is unclear if b should be set to $(\alpha N_{max}/sn_{eff})$ for all values of γ_{eff} , s , and z . The rejection then contends that the claim is indefinite.

In response, claim 6 has been amended to recite: “setting $b(\gamma_{eff}, s, z)$ equal to $(\alpha N_{max})/(s n_{eff})$ for all values of γ_{eff} and z .” Therefore the Applicants submit claim 6 is not indefinite under 35 USC § 112, second paragraph.

Claims 7 and 8 were rejected as being dependent upon a rejected parent claim, claim 4. Because claims 7 and 8 depend from, either directly or indirectly, from claim 4, and because claim 4 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claims 7 and 8 is now moot.

The rejection of claim 18 under 35 USC § 112, second paragraph asserts that the relationship in the claim is not fully defined so that one skilled in the art could utilize it. The rejection asserts that claim 18 is indefinite because there are items or functions in the claim that have no definition, and that the following variables or constants in the relationship of claim 1 are not defined: ϵ_s , and α . In response, Applicants have amended claim 18 to define ϵ_s , and α .

The rejection of claim 18 also asserts that the number of bit positions b is used as a function of 3 variables, (i.e., $b(\gamma_{eff}, s, z)$), although this function is not defined. The rejection further asserts that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), the relationship should be defined in the claim.

In response, the Applicants have amended claim 18 to provide a relationship to define $b(\gamma_{eff}, s, z)$. Therefore the Applicants submit claim 18 is not indefinite under 35 USC § 112, second paragraph.

Claim 19 was rejected as being dependent upon a rejected parent claim. Because claim 18 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 19 is now moot.

Claim 20 was rejected because the value of N_{max} is not defined. In response, claim 20 has been amended to define N_{max} as a predetermined value. Therefore the Applicants submit claim 20 is not indefinite under 35 USC § 112, second paragraph.

The rejection of claim 21 asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not fully defined because the definition of sn_{eff} is not provided in the claim, and the lacking definition renders the claim indefinite. The rejection further asserts that the claim is

indefinite because the target bit error rate p_e is also defined as the channel symbol error rate p_e .

In response, the Applicants have amended claim 21. The Applicants respectfully submit that s is defined in claim 18, from which claim 21 depends. The Applicants have amended claim 18 to define n_{eff} . Because claim 21 depends from claim 18, n_{eff} is defined for claim 21. Claim 21 has also been amended to delete the language that defines p_e as a channel symbol error rate. Therefore the Applicants submit claim 4 is not indefinite under 35 USC § 112, second paragraph.

Claim 22 was rejected as being dependent upon a rejected parent claim, claim 21. Because claim 21 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 22 is now moot.

The rejection of claim 23 asserts that the function of the number of bit positions of a quadrature amplitude modulation symbol $b(\gamma_{eff}, s, z)$ is set to $(\alpha N_{max}/sn_{eff})$, but is unclear if the number of bit positions b is a function (see regarding claim 1). The rejection further asserts that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), it is unclear if b should be set to $(\alpha N_{max}/sn_{eff})$ for all values of γ_{eff} , s , and z . The rejection then contends that the claim is indefinite.

In response, claim 23 has been amended to recite: “setting $b(\gamma_{eff}, s, z)$ equal to $(\alpha N_{max})/(s n_{eff})$ for all values of γ_{eff} and z .” Therefore the Applicants submit claim 23 is not indefinite under 35 USC § 112, second paragraph.

Claims 24 and 25 were rejected as being dependent upon a rejected parent claim, claim 21. Because claims 24 and 25 depend from, either directly or indirectly, from claim 21, and because claim 21 has been amended to overcome the rejection under

35 USC § 112, second paragraph, the Applicants submit that the rejection of claims 24 and 25 is now moot.

The rejection of claim 26 asserts that the relationship is not fully defined so that one skilled in the art could utilize it. The rejection further asserts that claim 26 is indefinite because there are items or functions in the claim that have no definition. The rejection also asserts that the following variables or constants in the relationship of claim 26 are not defined: ϵ_s , and α . In response, Applicants have amended claim 26 to define ϵ_s , and α .

The rejection of claim 26 also asserts that the number of bit positions b is used as a function of 3 variables, (i.e., $b(\gamma_{eff}, s, z)$), although this function is not defined. The rejection contends that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), the relationship should be defined in the claim.

In response, the Applicants have amended claim 26 to provide a relationship to define $b(\gamma_{eff}, s, z)$. Therefore the Applicants submit claim 26 is not indefinite under 35 USC § 112, second paragraph.

Claim 27 was rejected as being dependent upon a rejected parent claim. Because claim 26 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 27 is now moot.

Claim 28 was rejected because the value of N_{max} is not defined. In response, claim 28 has been amended to define N_{max} as a predetermined value. Therefore the Applicants submit claim 28 is not indefinite under 35 USC § 112, second paragraph.

The rejection of claim 29 asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate θ is not fully defined because the definition of sn_{eff} is not provided in the claim, and the lacking definition renders the claim indefinite. The rejection further asserts that the claim is indefinite because the target bit error rate p_e is also defined as the channel symbol error rate p_e .

In response, the Applicants have amended claim 29. The Applicants respectfully submit that s is defined in claim 26, from which claim 29 depends. The Applicants have amended claim 26 to define n_{eff} . Because claim 29 depends from claim 26, n_{eff} is defined for claim 29. Claim 29 has also been amended to delete the language that defines p_e as a channel symbol error rate. Therefore the Applicants submit claim 29 is not indefinite under 35 USC § 112, second paragraph.

Claim 30 was rejected as being dependent upon a rejected parent claim, claim 29. Because claim 29 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 30 is now moot.

The rejection of claim 31 asserts that the function of the number of bit positions of a quadrature amplitude modulation symbol $b(\gamma_{eff}, s, z)$ is set to $(\alpha N_{max}/sn_{eff})$, but is unclear if the number of bit positions b is a function (see regarding claim 1). The rejection also asserts that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), it is unclear if b should be set to $(\alpha N_{max}/sn_{eff})$ for all values of γ_{eff} , s , and z . The rejection then contends that the claim is indefinite.

In response, claim 31 has been amended to recite: "setting $b(\gamma_{eff}, s, z)$ equal to $(\alpha N_{max})/(s n_{eff})$ for all values of γ_{eff} and z ." Therefore the Applicants submit claim 31 is not indefinite under 35 USC § 112, second paragraph.

Claims 32 and 33 were rejected as being dependent upon a rejected parent claim. Because claims 32 and 33 depend from, either directly or indirectly, from claim 30, and because claim 30 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claims 32 and 33 is now moot.

The rejection of claim 41 under 35 USC § 112, second paragraph asserts that the relationship in the claim is not fully defined so that one skilled in the art could utilize it. The rejection asserts that claim 41 is indefinite because there are items or functions in the claim that have no definition, and that the following variables or constants in the relationship of claim 1 are not defined: ϵ_s , and α . In response, Applicants have amended claim 41 to define ϵ_s , and α .

The rejection of claim 41 also asserts that the number of bit positions b is used as a function of 3 variables, (i.e., $b(\gamma_{eff}, s, z)$), although this function is not defined. The rejection contends that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), the relationship should be defined in the claim.

In response, the Applicants have amended claim 41 to provide a relationship to define $b(\gamma_{eff}, s, z)$. Therefore the Applicants submit claim 41 is not indefinite under 35 USC § 112, second paragraph.

Claim 42 was rejected as being dependent upon a rejected parent claim. Because claim 41 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 42 is now moot.

Claim 43 was rejected because the value of N_{\max} is not defined. In response, claim 43 has been amended to define N_{\max} as a predetermined value. Therefore the Applicants submit 43 is not indefinite under 35 USC § 112, second paragraph.

The rejection of claim 44 asserts that the relationship for determining the difference between a bit error rate prior to decoding and the target bit error rate Θ is not fully defined because the definition of sn_{eff} is not provided in the claim, and the lacking definition renders the claim indefinite. The rejection further asserts that the claim is indefinite because the target bit error rate p_e is also defined as the channel symbol error rate p_e .

In response, the Applicants have amended claim 44. The Applicants respectfully submit that s is defined in claim 41, from which claim 44 depends. The Applicants have amended claim 41 to define n_{eff} . Because claim 44 depends from claim 41, n_{eff} is defined for claim 44. Claim 44 has also been amended to delete the language that defines p_e as a channel symbol error rate. Therefore the Applicants submit claim 44 is not indefinite under 35 USC § 112, second paragraph.

Claim 45 was rejected as being dependent upon a rejected parent claim. Because claim 44 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claim 45 is now moot.

The rejection of claim 46 asserts that the function of the number of bit positions of a quadrature amplitude modulation symbol $b(\gamma_{\text{eff}}, s, z)$ is set to $(\alpha N_{\max} / sn_{\text{eff}})$, but is unclear if the number of bit positions b is a function (see regarding claim 1). The rejection contends that if the number of bit positions b is a function of the effective signal to noise ratio (γ_{eff}), the number of DMT signals per frame (s), and the number of code control symbols per DMT symbol (z), it is unclear if b should be set to $(\alpha N_{\max} / sn_{\text{eff}})$ for all values of γ_{eff} , s , and z . The rejection then contends that the claim is indefinite.

In response, claim 46 has been amended to recite: “setting $b(\gamma_{eff}, s, z)$ equal to $(\alpha N_{max})/(s n_{eff})$ for all values of γ_{eff} and z .” Therefore the Applicants submit claim 46 is not indefinite under 35 USC § 112, second paragraph.

Claims 47 and 48 were rejected as being dependent upon a rejected parent claim. Because claims 47 and 48 depend from, either directly or indirectly, from claim 44, and because claim 44 has been amended to overcome the rejection under 35 USC § 112, second paragraph, the Applicants submit that the rejection of claims 47 and 48 is now moot.

Rejections Under 35 USC § 102(b)

Claims 1, 3, 18, 20, 26, 28, 41 and 43 have been rejected under 35 USC § 102(b) as being anticipated by the Chow et al patent (US Patent No. 5,479,447, granted to Peter S. Chow et al. on December 26, 1995).

The rejection asserts that the Chow et al patent discloses a method of determining an optimum bit load per sub-channel in a multi-carrier system with forward error correction (Fig. 1; col. 6, lines 61-67), comprising: computing one or more values of a maximum number of symbol errors that can be corrected by the signal to noise ratio (SNR) gap (col. 3, lines 50-67; col. 7, lines 45-50), and a number of symbols in the information field K (col. 7, lines 57-67) to determine the optimum bit load per sub-channel. The rejection further asserts that with regard to the relationships presented, even if they were enabled by the specification (see 112 1st paragraph rejections above), the relationships included in claim 1 of equations 16.1 thru 16.3 of the specification are inherent to the transmission system of the Applicant as well as the prior art reference, the Chow et al. patent. The rejection contends that equations 16.1 thru 16.3 are comprised of the inherent relationships between the bit size of a DMT symbol in a DMT system with FEC at the BER of ϵ . The rejection then contends that, hence, the relationship provides no limitation to the claim. The rejection notes that the laws of nature, physical

phenomena and abstract ideas are not patentable subject matter. The rejection asserts that *all* of the relationships provided for the derivation of equations 16.1 – 16.3 are drawn from inherent properties of the system and are not provided by novel or inventive steps. The rejection further asserts that the Chow et al. patent discloses selecting the maximum number of symbol errors that can be corrected t which is calculated by the coding gain included in the SNR gap (col. 3, lines 51-67), and the number of symbols in the information field K such that the uncoded bit error rate $p_{sub.b}$ that produces a symbol error rate that is less than or equal to the target symbol error rate (col. 7, line 47) is increased (col. 7, line 40 – col. 8, line 55).

The Applicants respectfully disagree, and this rejection is respectfully traversed. The Applicants submit that the relationships in claim 1 are provided by inventive steps. The following relationship in claim 1 is not an inherent property of the system: $\omega(b) = \frac{4}{2b+3}$. This relationship is an approximation (See Applicants' Specification, page 20, relationship (4.5)) that was determined by the inventors. The Chow et al patent does not disclose, expressly or inherently, such an approximation. Therefore the relationship is not an inherent relationship between the bit size of a DMT symbol in a DMT system with FEC at the BER of ϵ . In addition, the computing of one or more values of b based on one or more values of the number of symbols in the information field K and one or more values of the number of control code symbols per discrete-multi-tone symbol z of claim 1 using the relationships is not an inherent property.

In addition, claim 1 computes one or more values of a number of bit positions b of a quadrature-amplitude-modulation symbol based on one or more values of a number of symbols in the information field K , and one or more values of a number of control code symbols per discrete-multi-tone symbol z , to provide one or more determined values of b in accordance with the relationships. Furthermore, claim 1 has the limitation of "selecting the value of K and the value of z which provides a maximum

number of bit positions based on the one or more determined values of b .” The Chow et al patent does not disclose these limitations either expressly or inherently.

The rejection cites column 7, lines 57-67 of the Chow et al patent for the teaching of a number of symbols in the information field K. The Applicants submit that column 7, lines 57-67 of the Chow et al patent does not teach a number of symbols in the information field K. Column 7 of the Chow et al patent uses the term “ k ”. However, in the Chow et al patent, “ k is a count.” (Chow et al patent, column 7, line 54). Moreover, the Chow et al patent does not disclose a number of control code symbols per discrete-multi-tone symbol z .

Therefore, Applicants submit that claim 1 does provide a novel inventive step, and that claim 1 is not anticipated by the Chow et al patent. Hence, independent claim 1 is patentable under the provisions of 35 USC §102(b).

Claim 3 depends from claim 1. Therefore, claim 3 is patentable for the same reasons as claim 1.

Claim 18 includes similar distinguishing limitations to claim 1 and is patentable for the same reasons as claim 1. In addition, claim 18 includes a limitation of a maximum number of transmissions k when computing the one or more values of a number of bit positions b which is not disclosed by the Chow et al patent. For the foregoing reasons, the Applicants submit that claim 18 is patentable.

Because claim 20 depends from claim 18, claim 20 is patentable for the same reasons as claim 18.

Claim 26 includes limitations that are similar to claim 1 and is patentable for the same reasons as claim 1. Claim 28 depends from claim 26. Therefore, claim 28 is patentable for the same reasons as claim 26.

Claim 41 includes limitations that are similar to claim 18 and is patentable for the same reasons as claim 18. Claim 43 depends from claim 41. Therefore, claim 43 is patentable for the same reasons as claim 41.

Rejections Under 35 USC § 102(e)

Claims 1-3, 18-20, 26-28 and 41-43 have been rejected under 35 USC § 102(e) as being anticipated by the Levin et al patent (US Patent No. 6,130,882, granted to Howard E. Levin et al. on October 10, 2000).

The rejection asserts that the Levin et al patent discloses a method of determining an optimum bit load per sub-channel in a multi-carrier system (col. 1, lines 37-56) with forward error correction (abstract, col. 1, lines 20-56). The rejection further asserts that the Levin et al patent discloses a variable bit load multi-carrier discrete multi-tone (DMT) communications system wherein the bit rate is adapted according to the signal to noise ratio (Figs. 1-4). The rejection contends that as one skilled in the art understands, forward error correction (FEC) can be utilized in a communication system to overcome noisy channels and bit transmission errors. The rejection then contends that, however, FEC adds redundant bits to the transmission of data so that the receiver is able to correct errors in the transmission, and the redundant bits consume bandwidth. The rejection asserts that the system designer of a communication system using FEC must balance the need for encoding the data of the transmission according to the amount of perceived signal error at the side of the receiver with the least amount of redundant bits used for FEC encoding to increase the actual data throughput. The rejection further asserts that the "optimum bit load" and forward error correction encoding parameters are related. The rejection contends that the invention of the Levin et al patent is an adaptive FEC encoding technique which balances bit errors in a noisy channel with the optimum bit rate possible for the channel. The rejection further contends that the Levin et al patent does disclose computing one or more values of a

maximum number of symbol errors that can be corrected t by the calculation of the coding gain (col. 5, lines 45-56). The rejection contends that the Levin et al patent discloses that coding gain represents the increase in performance when block coding or convolutional coding is implemented, and that the data rate is calculated based on the desired performance margin, the number of carriers used in the system, the signal-to-noise ratio for the system (col. 6, lines 5-12). The rejection also asserts that the Levin et al patent discloses that the bit rate can be adjusted by the amount of error coding used (col. 6, line 13). The rejection further asserts that regarding claim 1, the Levin et al patent discloses determining the number of symbols in the information field K to determine the optimum bit load per subchannel (col. 4, line 51 – col. 5, line 18). The rejection then contends that with regard to the relationships presented, even if they were enabled by the specification, the relationships included in claim 1 of equations 16.1 through 16.3 of the specification are inherent to the transmission system of the Applicants as well as the prior art reference of the Levin et al patent. The rejection asserts that equations 16.1 through 16.3 are comprised of the inherent relationships between the bit size of a DMT symbol in a DMT system with FEC at the BER or epsilon. The rejection then contends that the relationship provides no limitation to the claim. The rejection notes that the laws of nature, physical phenomena and abstract ideas are not patentable subject matter. The rejection asserts that all of the relationships provided for the derivations of equations 16.1 through 16.3 are drawn from inherent properties of the system and are not provided by novel or inventive steps.

The Applicants respectfully disagree, and this rejection is respectfully traversed. The Applicants submit that the relationships in claim 1 are provided by inventive steps. The following relationship in claim 1 is not an inherent property of the

system: $\omega(b) = \frac{4}{2b + 3}$. This relationship is an approximation (See Applicants'

Specification, page 20, relationship (4.5)) that was determined by the inventors.

Therefore the relationship is not an inherent relationship between the bit size of a DMT symbol in a DMT system with FEC at the BER of ϵ . The Levin et al patent does not

disclose, expressly or inherently, such an approximation. In addition, the computing of one or more values of b based on one or more values of the number of symbols in the information field K and one or more values of the number of control code symbols per discrete-multi-tone symbol z of claim 1 using the relationships is not an inherent property.

Moreover, claim 1 computes one or more values of a number of bit positions b of a quadrature-amplitude-modulation symbol based on one or more values of a number of symbols in the information field K , and one or more values of a number of control code symbols per discrete-multi-tone symbol z , to provide one or more determined values of b in accordance with the relationship. The Levin et al patent does not expressly or inherently disclose computing one or more values of a number of bit positions b based on one or more values of a number of symbols in the information field K , and one or more values of a number of control code symbols per discrete-multi-tone symbol z .

Furthermore, claim 1 has the limitation of "selecting the value of K and the value of z which provides a maximum number of bit positions based on the one or more determined values of b ." The Levin et al patent does not disclose, expressly or inherently, selecting the value of K and the value of z which provides a maximum number of bit positions based on the one or more determined values of b .

Therefore, Applicants submit that claim 1 does provide a novel inventive step, and that claim 1 is not anticipated by the Levin et al patent. Hence, independent claim 1 is patentable under the provisions of 35 USC §102(e).

Claims 2 and 3 depend from claim 1. Therefore, claims 2 and 3 patentable for the same reasons as claim 1.

Claim 18 includes similar distinguishing limitations to claim 1 and is patentable for the same reasons as claim 1. In addition, claim 18 includes a limitation of a maximum number of transmissions k which is not disclosed by the Levin et al patent. Therefore Applicants submit that claim 18 is not anticipated by the Levin et al patent and is therefore patentable.

Because claims 19 and 20 depend from claim 18, claims 19 and 20 are patentable for the same reasons as claim 18.

Claim 26 includes limitations that are similar to claim 1 and is patentable for the same reasons as claim 1. Claims 27 and 28 depend from claim 26. Therefore, claims 27 and 28 are patentable for the same reasons as claim 26.

Claim 41 includes limitations that are similar to claim 18 and is patentable for the same reasons as claim 18. Claims 42 and 43 depend from claim 41. Therefore, claims 42 and 43 are patentable for the same reasons as claim 41.

CONCLUSION

Consequently, the Applicants believe that all the claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

Respectfully submitted,

July 12, 2004



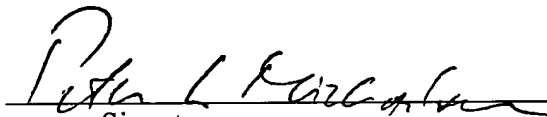
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